Citation:

Haines J, Neumark-Sztainer D, Wall M, Story M. Personal, behavioral, and environmental risk and protective factors for adolescent overweight. *Obesity (Silver Spring)*. 2007 Nov;15(11):2748-60.

PubMed ID: 18070766

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the influence of modifiable personal, behavioral and socio-environmental factors on obesity risk in youth.

Inclusion Criteria:

Middle school and high school students from Minnesota who completed surveys for both the Project EAT-I and Project EAT-II.

Exclusion Criteria:

- Middle school and high school students who completed surveys for Project EAT-I who were lost to follow-up before Project EAT-II due to missing contact information or no address found at follow-up
- Participants in Project EAT-I that declined to participate in Project EAT-II

Description of Study Protocol:

Recruitment

Middle and high school students from 31 Minnesota schools completed in-class surveys and anthropometric measurements during the 1998-1999 academic year.

Design

Prospective cohort study of the socio-economic, personal and behavioral predictors of dietary intake and weight status among an ethnically diverse population.

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

Multiple logistic regression was used with overweight status at Time 2 (Project EAT II Survey) was regressed on each specific personal, behavioral and socio-economic factor measured at Time 1 (Project EAT I Survey) as well as change in factor over time.

Data Collection Summary:

Timing of Measurements

Participants completed in-class surveys and anthropometric measurements during the 1998-1999 school year for Project EAT-I. Participants completed mailed surveys 5 years following the initial survey (2003-2004) for Project EAT-II.

Dependent Variables

- BMI based on self-reported height and weight measures at Time 1 (Project EAT-I survey) and at Time 2 (Project EAT-II survey)

Independent Variables

- Body satisfaction assessed with a modified version of the Body Shape Satisfaction Scale
- Depressive symptoms assessed using a 6-item scale developed by Kandel and Davies
- Weight concerns assessed with survey questions
- Dietary intake variables (energy, total fat, daily servings of fruits and vegetables, sugar-sweetened beverages, diet soda, snacks and milk) assessed with the 149-item, semiquantitative Youth and Adolescent Food Frequency Questionnaire. Fast food consumption and breakfast consumption were assessed with survey questions
- Moderate-to-vigorous physical activity was assessed with a modified version of the Leisure Time Exercise Questionnaire
- Hours spent participating in sedentary activities was assessed with survey questions
- Unhealthy weight control behaviors were assessed with survey questions
- Home availability of healthy food and low-nutrient, high-calorie food were assessed with survey questions
- Weight-related teasing was assessed with survey questions
- Parental weight related concerns were assessed with survey questions
- Peer dieting behaviors were assessed with survey questions
- Perceived parental overweight was assessed with survey questions

Control Variables

- Sex, ethnicity/race, age and socioeconomic status were based on self-report at Time 1

Description of Actual Data Sample:

Initial N: 4,746 participants (44.9% male)

Attrition (final N): All 2,516 participants completed both the Project EAT-I and Project EAT-II surveys

Age: One-third of the participants were in the younger cohort with a mean age of 12.8 ± 0.8 years at completion of the Project EAT-I survey and a mean age of 17.2 ± 0.6 years at the completion of the Project EAT-II survey. Two-thirds of the participants were in the older cohort with a mean age of 15.8 ± 0.8 years at the completion of the Project EAT-I survey and a mean age of 20.4 ± 0.8 years at the completion of the Project EAT-II survey.

Ethnicity: 48.3% white, 18.9% African American, 5.8% Hispanic, 19.6% Asian, 3.6% Native American and 3.8% mixed race or other.

Other relevant demographics: 17.8% low socioeconomic status, 18.9% middle-low, 26.7% middle, 23.3% middle-high and 13.3% high

Anthropometrics Not reported

Location: Minnesota, United States

Summary of Results:

Key Findings:
Female Subjects:
Personal Factors:

- Body satisfaction at Time 1 was negatively associated with Time 2 overweight
- Weight concerns at Time 1 were positively associated with Time 2 overweight
- The level of change for both of these predictor variables was also found to be associated with Time 2 overweight (increase in body satisfaction over time was protective for overweight, increasing weight concern was a risk factor for overweight)

Behavioral Factors:

- Hours spent engaged in sedentary behaviors, servings of sugar-sweetened beverages, servings of diet soda, use of unhealthy weight control behaviors, dieting and binge eating at Time 1 were associated with Time 2 overweight
- Servings of fruits and vegetables and breakfast consumption were negatively associated with Time 2 overweight
- Caloric intake and fast food consumption at Time 1 were negatively associated with Time 2 overweight *(result contrary to expectation to authors)*
- Increases in caloric intake and breakfast consumption over the study period were negatively associated with overweight at Time 2
- Increases in binge eating, dieting and unhealthy weight control behaviors over the study period were positively associated with Time 2 overweight.

Socio-environmental Factors:

- Parental weight concerns and behaviors and weight-related teasing at Time 1 as well as increases in these variables over the study period were positively associated with overweight at Time 2
- Home availability of high-calorie snack foods at Time 1 as well as increases in this variable were both negatively associated with Time 2 overweight *(result contrary to expectation to authors)*

Male Subjects:

Personal Factors:

- Body satisfaction at Time 1 and increases in body satisfaction over time were both found to be negatively associated with overweight at Time 2
- Depressive symptoms and weight concerns, as well as increase in weight concerns over time, were found to be positively associated with Time 2 overweight

Behavioral Factors:

- The use of healthy weight control behaviors and dieting at Time 1 were positively associated with Time 2 overweight
- Servings of snack foods per day and breakfast consumption at Time 1 were negatively associated with Time 2 overweight
- Increases over the study period in use of unhealthy weight control behaviors, dieting and diet soda intake were positively associated with overweight at Time 2
- Increases over the study period in hours of moderate-to-vigorous physical activity were associated with overweight at Time 2

Socio-economic Factors:

- Parental weight-related concerns and behaviors, weight-related teasing and peer dieting behaviors at Time 1 were positively associated with Time 2 overweight.
- Increases in parental weight related concerns and behaviors and peer dieting over the study were associated with Time 2 overweight.

Author Conclusion:

- Factors within all 3 domains; personal, behavioral and socio-environmental were significantly associated with overweight among both male and female participants.
- Fewer behavioral factors were found to be significantly associated with overweight in boys as compared with girls.
- A strong, consistent finding is that male and female adolescents who engaged in dieting and unhealthy weight control behaviors were more likely to be overweight at Time 2 than their non-dieting peers.
- Pressure from parents to lose weight is not effective in helping teens manage their weight and may actually be harmful.
- Interventions that increase adolescents' discomfort with their bodies and their weight and that pressure them to lose weight, diet or use unhealthy weight control behaviors are not likely to be effective.

Reviewer Comments:

- *Attrition in the study population between surveys was not equally distributed across sociodemographic characteristics. To compensate the data were weighted using the response propensity method so that estimates would be generalizable to a population with the demographic makeup of the original Project EAT sample.*
- *Participants that did not complete a Project EAT-II survey differed from participants that completed both surveys in than male participants who reported binge eating at baseline were less likely to complete a Project EAT-II survey and female participants with lower self-reported moderate-to-vigorous physical activity were less likely to complete a Project*

EAT-II survey.

- *All data collected in the Project EAT-II survey were self-reported including weight.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes

3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A

6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	N/A
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes

8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes